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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/706,507	11/03/2000	John McCafferty	28111/32729E	7056
22930	7590	05/05/2006	EXAMINER	
HOWREY LLP C/O IP DOCKETING DEPARTMENT 2941 FAIRVIEW PARK DR, SUITE 200 FALLS CHURCH, VA 22042-2924			LUNDGREN, JEFFREY S	
ART UNIT		PAPER NUMBER		1639

DATE MAILED: 05/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/706,507	MCCAFFERTY ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jeff Lundgren	1639	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 16 July 2004.

2a)  This action is **FINAL**.                            2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## **Disposition of Claims**

4)  Claim(s) 44-51 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5)  Claim(s) \_\_\_\_\_ is/are allowed.

6)  Claim(s) 44-51 is/are rejected.

7)  Claim(s) \_\_\_\_\_ is/are objected to.

8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3)  Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date *see office action*.  
4)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.  
5)  Notice of Informal Patent Application (PTO-152)  
6)  Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

In response to the Restriction Requirement mailed on May 21, 2001, Applicants have elected Group I, claims 44-47 and 50, with traverse. Applicants argue that all of the claims should be examined together since the claims have been copied from U.S. Patent No. 5,985,588 in order to provoke an interference.

Since the claims of Groups I-III do not represent a serious burden to search, Groups II and III will be rejoined with Group I. Accordingly, claims 44-51 are being examined on the merits.

### ***Information Disclosure Statement***

The information disclosure statements (IDS) submitted on November 3, 2000, and October 1, 2002, have been considered by the Examiner. The submission is in compliance with the provisions of 37 CFR § 1.97. Enclosed with this Office Action is a return-copy of the Form PTO-1449 with the Examiner's initials and signature indicating those references that have been considered.

### ***Objection to the Abstract Under 37 C.F.R. § 1.72***

The abstract of the disclosure is objected to because it does not allow the public generally to determine quickly from a cursory inspection the nature and gist of the invention. Applicants should amend the abstract so that it corresponds to at least one independent claim. For example, Applicants should provide an abstract that describes each of the claim elements of at least one independent claim, such as claim 47. *See* 37 C.F.R. § 1.72. Should Applicants amend the claims in their next reply, the amended abstract should take into account any further limitations added to the broadest independent claim.

### ***Priority***

Acknowledgment is made of applicant's claim for foreign priority based on applications filed in Great Britain. It is noted, however, that Applicants have not filed certified copies of the priority Applications as required by 35 U.S.C. 119(b).

***Claim Rejections - 35 USC § 112, second paragraph***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 44-51 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 44, and all claims dependent therefrom, are rejected for reciting the phrase “amino acid carboxy domains” because the metes and bounds of this limitation cannot be determined. This term does not appear to be an art-accepted term, nor is defined in the specification. One of ordinary skill in the art would not be able to clearly define this limitation. Similarly, claim 48 is indefinite for reciting “contiguous amino and carboxy domain of a coliphage pIII protein.” Correction is required.

***Claim Rejections - 35 USC § 112, first paragraph (New Matter)***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 44-51 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

It appears that the limitation “contiguous amino acid carboxy domains of a coliphage pIII protein” in claim 44 has been copied from U.S. Patent No. 5,985,588, but do not find support in the instant application. Also, it appears that Applicants do not have support for the “contiguous amino and carboxy domain of a coliphage pIII protein” as recited in claim 48. Correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claim 44, 47, 48 and 50 are rejected under 35 U.S.C. 102(e) as being anticipated by Dower *et al.*, U.S. Patent No. 5,427,908, issued on June 27, 1995, filed on May 1, 1990.

Claim 44 is directed to A phagemid comprising DNA encoding a polypeptide-coliphage pIII fusion protein, wherein said fusion protein comprises a single-chain polypeptide and a functional coliphage pIII polypeptide, and said functional coliphage pIII polypeptide comprises contiguous amino and carboxy domains of a coliphage pIII protein.

Dower teaches a method for the production of phagemid for expressing antibody fragments, such as single-chain antibodies:

“Particularly preferred examples of such vectors are the filamentous phage fd, f1 and M13. In this embodiment a library of DNA sequence members, each joined to a first nucleotide sequence coding for a tag protein, is cloned into an appropriate location of the phage genome, behind an appropriate promoter and translation sequences and a sequence encoding a signal peptide leader directing transport of the downstream fusion protein to the periplasmic space. The phage vector also contains a second DNA sequence inserted into a coat protein gene to express a tag ligand peptide acting as a ligand for the tag protein, which peptide is expressed in a location of the coat protein exposed to the external environment of the phage and, so, is accessible for binding by the tag protein. In a preferred embodiment this peptide is located *at or near the N-terminus of the pIII*

*coat protein*. The protein(s) of interest are expressed and transported to the periplasmic space, and the properly assembled proteins are adsorbed to the phage particle by virtue of the interaction of the tag protein with the ligand peptides on the phage as the phage particles are extruded from the cell. Phage bearing the desired protein are then selected by means of a ligand specific for the protein of interest.”

Dower, at col. 2, lines 19-43 (emphasis added); and:

“When the protein of interest is an antibody of a desired binding specificity, the *antibody may be of any of the known isotypes or subclasses for a particular species, and may be a single-chain or two-chain binding complex or portion thereof*. For instance, only the variable antigen-binding regions of heavy (V<sub>H</sub>) and/or light (V<sub>L</sub>) chains may be identified and cloned; the binding fragments (F<sub>v</sub>) or Fab encoded thereby may find use either as a binding fragment, joined to constant regions of heavy or light chains, or joined to other proteins having desired effector functions. The characteristics of the constant region domains will depend to a large extent on the use intended for the antibody, e.g., diagnostic and/or therapeutic applications, catalytic antibodies, etc.”

Dower, at col. 3, lines 28-42 (emphasis added).

Dower also provides an example of the claimed subject matter in Example 1 (col. 12, lines 45-68).

Claim 47 is directed to a phagemid according to claim 44, further comprising expression control elements upstream of said DNA and further encoding at least one selectable marker; this limitation is taught by Dower (see vector used in Example I). Claim 50 requires the polypeptide be full length; Dowers pIII is full length (see emphasized section above; see also Example I; even if Dower exemplifies an antibody within the N-terminal region of the pIII, the protein is still considered to be full length).

Claim 48 is directed to a process for the production of a phagemid according to claim 44, comprising fusing a DNA encoding a single-chain polypeptide to a DNA encoding a functional coliphage pIII polypeptide, wherein said functional coliphage pIII polypeptide comprises contiguous amino and carboxy domains of a coliphage pIII protein, and inserting the resulting DNA molecule into a phagemid. Again, this claim is anticipated for the reasons explained above.

Claim 51 is directed to a method of screening for binding ligands, comprising exposing ligands to a single chain polypeptide-coliphage pIII protein expressed by the phagemid of claim 44 and selecting those ligands which recognize and bind to the single chain polypeptide-coliphage pIII protein; Dower teaches this limitation at col. 6, line 54 through col. 7, line 4.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 44-51 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cwirla *et al.*, *Proc. Natl. Acad. Sci. USA* 87:6378-6382 (1990), in view of Dower *et al.*, U.S. Patent No. 5,427,908, issued on June 27, 1995, filed on May 1, 1990.

Claim 44 is directed to A phagemid comprising DNA encoding a polypeptide-coliphage pIII fusion protein, wherein said fusion protein comprises a single-chain polypeptide and a functional coliphage pIII polypeptide, and said functional coliphage pIII polypeptide comprises contiguous amino and carboxy domains of a coliphage pIII protein. Claim 45 limits the protein to a single-chain antibody. Claim 46 further requires a protease sensitive site between the single-chain polypeptide and the coliphage pIII polypeptide. Claim 47 is directed to a phagemid according to claim 44, further comprising expression control elements upstream of said DNA and further encoding at least one selectable marker. Claim 50 requires the pIII polypeptide to be full length.

Claim 48 is directed to a process for the production of a phagemid according to claim 44, comprising fusing a DNA encoding a single-chain polypeptide to a DNA encoding a functional coliphage pIII polypeptide, wherein said functional coliphage pIII polypeptide comprises contiguous amino and carboxy domains of a coliphage pIII protein, and inserting the resulting DNA molecule into a phagemid. Claim 49 requires a protease sensitive site between the pIII and peptide. Claim 51 is directed to a method of screening for binding ligands, comprising exposing ligands to a single chain polypeptide-coliphage pIII protein expressed by the phagemid of claim 44 and selecting those ligands which recognize and bind to the single chain polypeptide-coliphage pIII protein; Dower teaches this limitation at col. 6, line 54 through col. 7, line 4.

Cwirla teaches the construction of a library of phage displaying a library of hexapeptides and shows the vector fAFF1 in Fig. 1:

“The adsorption protein, pIII, is made as a precursor protein with an 18-amino acid leader sequence that directs pIII to the inner membrane of the bacterial host cell before assembly into intact phage particles (17, 18). *We constructed a peptide library by cloning oligonucleotides of the structure shown in Fig. 1 to place the variable hexapeptide region at the N terminus of the processed protein. These first six residues are followed by two glycine residues (as a flexible spacer) and then the normal sequence of pIII.* The library consists of 3 x 108 independent recombinants recovered as tetracycline-resistant colonies; 72% of these produced infective phage.”

Cwirla, at page 6379, col. 2, third full paragraph and refer to Fig. 1A and 1B (emphasis added). The protease-sensitive region between the hexapeptide and the pIII coding region could be considered to protease-sensitive as in claims 48 and 51.

Although Cwirla teaches a phagemid having a hexapeptide-coliphage pIII protein, Cwirla does not explicitly teach that the inserted peptide should be a single chain antibody, as required in claim 47.

Dower teaches a method for the production of phagemid for expressing antibody fragments, such as single-chain antibodies:

“Particularly preferred examples of such vectors are the filamentous phage fd, fl and M13. In this embodiment a library of DNA sequence members, each joined to a first nucleotide sequence coding for a tag protein, is cloned into an appropriate location of the phage genome, behind an appropriate promoter and translation sequences and a sequence encoding a signal peptide leader directing transport of the downstream fusion protein to the periplasmic space. The phage vector also contains a second DNA sequence inserted into a coat protein gene to express a tag ligand peptide acting as a ligand for the tag protein, which peptide is expressed in a location of the coat protein exposed to the external environment of the phage and, so, is accessible for binding by the tag protein. In a preferred embodiment this peptide is located *at or near the N-terminus of the pIII coat protein*. The protein(s) of interest are expressed and transported to the periplasmic space, and the properly assembled proteins are adsorbed to the phage particle by virtue of the interaction of the tag protein with the ligand peptides on the phage as the phage particles are extruded from the cell. Phage bearing the desired protein are then selected by means of a ligand specific for the protein of interest.”

Dower, at col. 2, lines 19-43 (emphasis added); and:

“When the protein of interest is an antibody of a desired binding specificity, the *antibody may be of any of the known isotypes or subclasses for a particular species, and may be a single-chain or two-chain binding complex or portion thereof*. For instance, only the variable antigen-binding regions of heavy (V<sub>H</sub>) and/or light (V<sub>L</sub>) chains may be identified and cloned; the binding fragments (F<sub>v</sub>) or Fab encoded thereby may find use either as a binding fragment, joined to constant regions of heavy or light chains, or joined to other proteins having desired effector functions. The characteristics of the constant region domains will depend to a large extent on the use intended for the antibody, e.g., diagnostic and/or therapeutic applications, catalytic antibodies, etc.”

Dower, at col. 3, lines 28-42 (emphasis added).

One of ordinary skill in the art would have had a reasonable expectation of success in arriving at the invention as claimed because the teachings of each of Cwirla and Dower are directed towards compositions and methods for expressing certain proteins through coliphage at or near the pIII protein. One of ordinary skill in the art would have been motivated to utilize the antibody construction method of Dower for producing a library single-chain antibody fragments with the phagemid of Cwirla because the processing effects are not a severe limitation and would be useful in finding optimum antibody fragments towards a give antigen (Cwirla, at page 6382, cols. 1 and 2). Therefore, the invention as a whole, is *prima facie* obvious at the time it was invented.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 44-51 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 47-53 of copending Application No. 09/417,479. Although the conflicting claims are not identical, they are not patentably distinct from each other because each of the claims are directed to essentially the same subject matter.

Claims 44 and 45 of the instant application are obvious in view of claim 44 of the '479 application. Claim 46 is obvious in view of claim 48 of the '479 application. Claim 48 is obvious in view of claim 50 of the '479 application. Claim 49 is obvious in view of claim 51 of the '479 application. Claim 50 is obvious in view of claim 47 of the '479 application.

Claims 47 and 51 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 47-53 of copending Application No. 09/417,479 in view of Dower *et al.*, U.S. Patent No. 5,427,908, issued on June 27, 1995, filed on May 1, 1990.

The limitations of claim 44 have been set forth above, and are herein incorporated to this rejection by reference.

The claims of the '479 application do not explicitly state the phagemid have expression control elements upstream and a selectable marker, as required by claim 47. The claims of the '479 application do not explicitly require the screening limitations of claim 51.

Dower teaches the upstream regulatory elements and selection marker (see phagemid used in Example 1); Dower also teaches the screening limitations of claim 51 (col. 6, line 54 through col. 7, line 4).

One of ordinary skill in the art would have been motivated by the teachings of Dower to modify the claims of the '479 application to incorporate the regulatory elements and selection markers of Dower to provide phage that can be successfully expressed and screened for in determining antibodies that bind to target ligand. One of ordinary skill in the art would have had a reasonable expectation of success in arriving at the invention as claimed since both the '479 application and Dower are each concerned with providing a library of phage displayed peptides,

including antibodies. Accordingly, the invention as a whole is *prima facie* obvious at the time it was invented.

This is a provisional obviousness-type double patenting rejection.

***Conclusions***

No claim is allowable.

If Applicants should amend the claims, a complete and responsive reply will clearly identify where support can be found in the disclosure for each amendment. Applicants should point to the page and line numbers of the application corresponding to each amendment, and provide any statements that might help to identify support for the claimed invention (e.g., if the amendment is not supported *in ipsius verbis*, clarification on the record may be helpful). Should Applicants present new claims, Applicants should clearly identify where support can be found in the disclosure.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Jeff Lundgren whose telephone number is 571-272-5541. The Examiner can normally be reached from 7:00 AM to 5:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Andrew Wang can be reached on 571-272-0811. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JSL

JON EPPERSON, PH.D.  
PATENT EXAMINER

